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PATENT SPECIFICATION

613,090



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PROVISIONAL SPECIFICATION

Improvements in or relating to Constructional Materials

I, JAMES BENNIE, a British subject, of 2, Tinworth Street, London, S.E.11, do hereby declare the nature of this invention to be as follows:—

5 This invention is for improvements in or relating to constructional materials.

It is an object of the present invention to provide a simple and economical process for the manufacture of constructional materials having a basis of fibrous substance or light weight porous substance.

10 In my earlier Specifications Nos. 551,658, 551,701, 557,370, and 557,371, I have described processes for the manufacture of building elements or constructional materials having a basis of fibrous material and particularly vegetable fibrous material such as sawdust bonded with alkali silicate which may be mixed
20 with alkali silico-fluoride, hydraulic cement and inorganic fillers. In one modification of these processes the various ingredients are worked into a plastic mass and rolled between two webs of a fibrous material such as paper.

25 In my Specification 1975/46 (Serial No. 606,848) I have described a process for the manufacture of a building element by mixing sawdust or a mixture of sawdust and inorganic fibrous material with zinc oxide and with an aqueous solution of sodium silicate (substantially 75° Twaddle) to form a plastic mix and rolling or otherwise moulding the mixture into the building element desired, conveniently
30 between adherent flexible sheets and thereafter drying.

According to the present invention, a process for the production of a consolidated constructional material having a basis of fibrous or light weight porous substance comprises soaking the said material in an aqueous solution of alkali silicate, e.g., sodium silicate, removing
40 excess liquid from the material, drying the moist material under such conditions as to yield a crumbly mass, mixing the

said mass with sodium silicate syrup to form a plastic mix and rolling or otherwise moulding the mix into the constructional material desired and heating to drive off moisture.

The fibrous or light weight porous material may be organic or inorganic or may consist of a mixture of organic and inorganic substances. Thus, it may consist, e.g., of sawdust, flax shives, bark, peat, straw, reeds or cork or of slag or of asbestos or like wool or of vermiculite in expanded form or of mixtures of two or more of the foregoing materials.

The aqueous solution of alkali silicate may conveniently consist of a solution of sodium silicate, e.g., of 8 parts by weight of sodium silicate (75 Twaddle) mixed with 1 part by weight of water and the soaking may be carried out until the fibrous or porous material is substantially completely saturated. Removal of the excess of liquid may be effected by squeezing or straining or centrifuging and the drying may be carried out in one or more stages, e.g., at a temperature between 150° and 210° C. at atmospheric or at subatmospheric pressure. During the drying operation or between successive stages in the drying the mass may be ground, crushed or otherwise disintegrated so as to produce a crumbly mass. Alternatively, or additionally, the mass may be maintained in agitation during the drying.

The dried material may be mixed with syrupy sodium silicate, e.g., of 75 Twaddle, to form a plastic mix and the mix formed into the constructional elements desired.

The plastic mix may conveniently be rolled between flexible sheets, e.g., between sheets of paper to form a composite sheet or slab.

The final drying of the moulded article is carried out by heating, e.g., between 75° and 110° C. at atmospheric pressure or

under vacuum.

In an alternative process the plastic mix is sheeted between sheets of paper between rollers, the sheet placed between perforated plates provided with distance pieces and the whole sandwiched between heated plates maintained at a temperature insufficient to scorch the paper, e.g., at 100° to 125° C. The heating is continued, e.g., for 20 to 30 minutes and the board is then heated in a drying oven, e.g., for 20 minutes at about 200° to 210° C.

When it is desired to render the con-

structional material resistant to moisture, the final product or the fibrous material after treatment with alkali silicate or the paper webs between which the plastic mix may be pressed may be treated with a dilute solution of glue, e.g., rabbit's skin glue which is then hardened by treatment with a dilute solution of formaldehyde.

Dated this 5th day of June, 1946.

BOULT, WADE & TENNANT,

111 & 112, Hatton Garden,

London, E.C.1,

Chartered Patent Agents.

COMPLETE SPECIFICATION

Improvements in or relating to Constructional Materials

I, JAMES BENNIE, a British subject, of 2, Tinworth Street, London, S.E.11, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention is for improvements in or relating to constructional materials.

It is an object of the present invention to provide a simple and economical process for the manufacture of constructional materials having a basis of fibrous substance or light weight porous substance.

In my earlier Specifications Nos. 551,658, 551,701, 557,370 and 557,371, I have described processes for the manufacture of building elements or constructional materials having a basis of fibrous material and particularly vegetable fibrous material such as sawdust bonded with alkali silico-fluoride, hydraulic cement and inorganic fillers. In one modification of these processes the various ingredients are worked into a plastic mass and rolled between two webs of a fibrous material such as paper.

In my Specification 1975/46 (Serial No. 606,848), I have described a process for the manufacture of a building element by mixing sawdust or a mixture of sawdust inorganic fibrous material with zinc oxide and with an aqueous solution of sodium silicate (substantially 75° Twaddell) to form a plastic mix and rolling or otherwise moulding the mixture into the building element desired between adherent flexible sheets and thereafter drying.

According to the present invention, a process for the production of a consolidated constructional material having a basis of fibrous or light weight porous substance comprises soaking the said material in an aqueous solution of alkali

silicate, e.g., sodium silicate, removing excess liquid from the material, drying the material under such conditions as to yield a crumbly mass, mixing the said mass with sodium silicate syrup to form a plastic mix and rolling or otherwise moulding the mix into the constructional material desired and heating to drive off moisture.

The fibrous or light weight porous material may be organic or inorganic or may consist of a mixture of organic and inorganic substances. Thus, it may consist, e.g., of sawdust, flax shives, bark, peat, straw, reeds or cork or of slag wool or of asbestos or like wool or of vermiculite in expanded form or of mixtures of two or more of the foregoing materials.

The aqueous solution of alkali silicate with which the fibrous material is soaked may conveniently consist of a solution of sodium silicate, e.g., of 8 parts by weight of sodium silicate (75 Twaddell having a $\text{Na}_2\text{O}:\text{SiO}_2$ ratio of substantially 1:3.2) mixed with 1 part by weight of water and the soaking may be carried out until the fibrous or porous material is substantially completely saturated. Removal of the excess of liquid may be effected by squeezing or straining or centrifuging and the drying may be carried out in one or more stages, e.g., at a temperature between 150° and 210° C. at atmospheric or at subatmospheric pressure. During the drying operation or between successive stages in the drying the mass may be ground, crushed or otherwise disintegrated so as to produce a crumbly mass. Alternatively, or additionally, the mass may be maintained in agitation during the drying.

The dried material may be mixed with sufficient syrupy sodium silicate, e.g., of 75 Twaddell as above, to form a plastic mix and the mix formed into the constructional elements desired.

The plastic mix may conveniently be rolled between flexible sheets, e.g., between sheets of paper to form a composite sheet or slab.

- 5 The final drying of the moulded article is carried out by heating, e.g., between 75° and 110° C. at atmospheric pressure or under vacuum.

- 10 In an alternative process the plastic mix is sheeted between sheets of paper between rollers, the sheet placed between perforated plates provided with distance pieces and the whole sandwiched between heated plates maintained at a temperature insufficient to scorch the paper, e.g., at 100° to 125° C. The heating is continued, e.g., for 20 to 30 minutes and the board is then heated in a drying oven, e.g., for 20 minutes at about 200° to 210° C.

- 20 When it is desired to render the constructional material resistant to moisture, the final product or the fibrous material after treatment with alkali silicate or the paper webs between which the plastic mix may be pressed may be treated with a dilute solution of glue, e.g., rabbit's skin glue which is then hardened by treatment with a dilute solution of formaldehyde.

- 30 Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A process for the production of a 35 consolidated constructional material having a basis of fibrous or light weight porous substance which process comprises soaking the said material in an aqueous solution of alkali silicate, e.g., sodium silicate, removing excess liquid from the 40 material, drying the moist material under such conditions as to yield a crumbly mass, mixing the said mass with sodium silicate syrup to form a plastic mix and rolling 45 or otherwise moulding the mix into the constructional material desired and heating to drive off moisture.

2. A process as claimed in claim 1, wherein the fibrous or light weight porous 50 material consists of sawdust, flax shives, bark, peat, straw, reeds or cork.

3. A process as claimed in claim 1 wherein the fibrous or light weight porous material consists of slag wool or of 55 asbestos.

4. A process as claimed in claim 1 wherein the fibrous or light weight porous material consists of vermiculite in expanded form.

5. A process as claimed in any one of 60 the preceding claims, wherein the fibrous or light weight material is soaked until the material is substantially completely saturated.

6. A process as claimed in any one of 65 the preceding claims wherein the drying is carried out in one or more stages at a temperature between 150° and 210° C.

7. A process as claimed in claim 6 wherein during the drying operation or 70 between successive stages in the drying the material is reduced to a crumbly mass.

8. A process as claimed in claim 7 wherein the mass is maintained in agita- 75 tion during the drying.

9. A process as claimed in any one of the preceding claims wherein the sodium silicate with which the dried material is 80 mixed is 75 Twaddell sodium silicate.

10. A process as claimed in any one of the preceding claims wherein the plastic mix is rolled between flexible sheets.

11. A process as claimed in claim 10 wherein the plastic mix is rolled between 85 sheets of paper.

12. A process as claimed in any one of the preceding claims wherein the final drying of the moulded article is carried 90 out by heating to between 75° and 110° C.

13. A process as claimed in any one of the preceding claims 1 to 11 wherein the plastic mix is sheeted between sheets of paper between rollers, the sheet placed 95 between perforated plates provided with distance pieces and the whole sandwiched between heated plates maintained at a temperature insufficient to scorch the paper.

14. A process as claimed in any one of 100 the preceding claims wherein the final product or the fibrous material after treatment with alkali silicate or the paper webs between which the plastic mix may be pressed is or are treated with a dilute 105 solution of glue, e.g., rabbit's skin glue which is then hardened by treatment with a dilute solution of formaldehyde.

15. A consolidated constructional material when prepared by the process 110 claimed in any one of the preceding claims.

Dated this 4th day of July, 1947.

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